

# INTERNATIONAL SEARCH REPORT

Intel Application No  
PCT/GB2004/004047

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 F25J1/02 F25B9/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 F25J F25B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)  
EP0-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 611 216 A (HOUSER CLARENCE G ET AL) 18 March 1997 (1997-03-18) column 2, line 22 - column 3, line 13 column 11, line 26 - line 45; figures -----	1-10,26
P,X	FOGLIETTA J H ET AL: "CONSIDER DUAL INDEPENDENT EXPANDER REFRIGERATION FOR LNG PRODUCTION NEW METHODOLOGY MAY ENABLE REDUCING COST TO PRODUCE STRANDED GAS" HYDROCARBON PROCESSING, GULF PUBLISHING CO. HOUSTON, US, vol. 83, no. 1, January 2004 (2004-01), pages 39-44, XP001180157 ISSN: 0018-8190 figure 7 ----- -/--	1,6,10, 26

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

14 February 2005

Date of mailing of the international search report

18. 03. 2005

Name and mailing address of the ISA

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2003/005722 A1 (HUDSON HANK M ET AL) 9 January 2003 (2003-01-09) figures	1,3,4,6, 8,10,26
A	----- US 4 539 028 A (LEROUX DIDIER ET AL) 3 September 1985 (1985-09-03) figure 1	1,2,5,6, 9,10,26
A	----- US 4 094 655 A (KRIEGER HEINRICH) 13 June 1978 (1978-06-13) figure 1	1,2,5,6, 9,10,26
A	----- HEINZ BAUER: "A novel Concept" INTERNATIONAL JOURNAL OF HYDROCARBON ENGINEERING, PALLADIAN PUBLICATIONS, ELSTEAD, GB, May 2002 (2002-05), pages 59-63, XP009025584 ISSN: 1364-3177 figures 2,5	7,9
A	----- WO 01/69149 A (STATOIL ; PAUROLA PENTTI (NO); FREDHEIM ARNE OLAV (NO)) 20 September 2001 (2001-09-20) the whole document	8,14-25
X	----- PARADOWSKI H ET AL: "La liquéfaction des gaz associés" INTERNATIONAL CONFERENCE ON LNG, XX, XX, 15 May 1983 (1983-05-15), page Complete, XP002138034 figure 3; table 6	11-25
X	----- US 4 339 253 A (CAETANI ENZO ET AL) 13 July 1982 (1982-07-13) column 18, line 9 - line 19; figure 4	11-25
X	----- US 6 449 984 B1 (PARADOWSKI HENRI) 17 September 2002 (2002-09-17) column 14, line 44 - line 59; figure 1; table	11,13, 15-25
A	----- US 4 548 629 A (CHIU ET AL) 22 October 1985 (1985-10-22) column 3, lines 24-26 column 6, lines 42-45 column 7, lines 60-63; figures	8,14,15, 25
P,X	----- US 6 722 157 B1 (EATON ANTHONY P ET AL) 20 April 2004 (2004-04-20)	25
P,A	the whole document	14-24
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## INTERNATIONAL SEARCH REPORT

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PCT/GB2004/004047

### Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

### Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

see additional sheet

As a result of the prior review under R. 40.2(e) PCT,  
no additional fees are to be refunded.

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☒ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-10,26

A method of liquefying a hydrocarbon-rich gas by three cascaded refrigeration circuits, each circuit comprising a compressor, wherein at least part of the flow of refrigerant from the second circuit is used for the preliminary cooling of the hydrocarbon-rich gas in the first refrigeration stage.

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2. claims: 11-25

A method of liquefaction comprising a plurality cascaded refrigeration circuits, each circuit comprising a compressor, wherein each compressor having a substantially equal share of the total load.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

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